



# Cab and Body Systems and Components

## Course Plan

### Course Details

<b>Certification:</b>	Emergency Vehicle Technician I
<b>CTS Guide:</b>	Emergency Vehicle Technician (June 2018)
<b>Description:</b>	This course provides an overview of the knowledge and skills needed to inspect, maintain, repair, and test emergency vehicle cab and body systems and components.
<b>Designed For:</b>	The emergency vehicle technician pursuing SFT-certification or anyone seeking an overview of emergency vehicle cab and body systems and components
<b>Prerequisites:</b>	Emergency Vehicle Technician 1A: Emergency Vehicle Technician 101
<b>Standard:</b>	Complete all activities and formative tests. Complete all summative tests with a minimum score of 80%.
<b>Hours:</b>	Lecture: 11:00 Activities: 0:00 Testing: 1:00
<b>Hours (Total):</b>	12:00
<b>Maximum Class Size:</b>	30
<b>Instructor Level:</b>	Primary
<b>Instructor/Student Ratio:</b>	1:30
<b>Restrictions:</b>	None
<b>SFT Designation:</b>	CFSTES

## Required Resources

### Instructor Resources

To teach this course, instructors need:

- NFPA 1911 (current edition): Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus
- Student Supplement
  - Provided by California Fire Mechanic's Academy, Inc.
- Manufacturer manuals and documentation
- Personal protective equipment (PPE)

### Online Instructor Resources

The following instructor resources are available online:

- None

### Student Resources

To participate in this course, students need:

- Access to NFPA 1911 (current edition): Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus
- Student Supplement
  - Provided by California Fire Mechanic's Academy, Inc.
- Access to manufacturer manuals and documentation
- Personal protective equipment (PPE)

### Facilities, Equipment, and Personnel

The following facilities, equipment, or personnel are required to deliver this course:

#### Classroom

- Standard classroom equipped for 30 students
- Projector with appropriate laptop connections
- Wifi/Internet access

#### Facilities

- OSHA compliant shop
- Safety stands

#### Equipment

- Emergency vehicle or apparatus with a cab and body
- Vehicle lifts
- Test, calibration, and diagnostic equipment
- Tools required to inspect, maintain, and repair cab and body systems and components
- Appropriate safety gear

### Unit 1: Introduction

#### Topic 1-1: Orientation and Administration

##### Terminal Learning Objective

At the end of this topic, a student will be able to identify facility and classroom requirements and identify course objectives, events, requirements, assignments, activities, resources, evaluation methods, and participation requirements in the course syllabus.

##### Enabling Learning Objectives

1. Identify facility requirements
  - Restroom locations
  - Food locations
  - Smoking locations
  - Emergency procedures
2. Identify classroom requirements
  - Start and end times
  - Breaks
  - Electronic device policies
  - Special needs and accommodations
  - Other requirements as applicable
3. Review course syllabus
  - Course objectives
  - Calendar of events
  - Course requirements
  - Student evaluation process
  - Assignments
  - Activities
  - Required student resources
  - Class participation requirements

##### Discussion Questions

1. What is a formative test? What is a summative test?

##### Activities

1. To be determined by the instructor.

#### Topic 1-2: Emergency Vehicle Technician Certification Process

##### Terminal Learning Objective

At the end of this topic, a student will be able to identify different levels in the Emergency Vehicle Technician certification track, the courses and requirements for State Fire Training (SFT) Emergency Vehicle Technician (EVT) certification, and be able to describe the capstone task book and testing process.

# Emergency Vehicle Technician 1C

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## Enabling Learning Objectives

1. Identify the different levels of certification in the Emergency Vehicle Technician (EVT) certification track
  - EVT I
  - EVT II
  - EVT III
2. Identify the courses required for EVT I
  - State Fire Training
    - Emergency Vehicle Technician 1A : Emergency Vehicle Technician 101
    - Emergency Vehicle Technician 1B : Chassis Systems and Components
    - Emergency Vehicle Technician 1C : Cab and Body Systems and Components
    - Emergency Vehicle Technician 1D : Electrical Systems A
    - Emergency Vehicle Technician 1E : Pumps and Accessories
    - Emergency Vehicle Technician 1F : Tanks and Accessories
  - National Institute for Auto Service Excellence (ASE)
    - Gasoline Engines (T1)
    - Drive Train (T3)
    - Brakes (T4)
    - Suspension and Steering (T5)
    - Preventative Maintenance Inspections (T8)
3. Identify the courses required for EVT II
  - State Fire Training
    - Emergency Vehicle Technician 2A : Electrical Systems B
  - National Institute for Auto Service Excellence (ASE)
    - Diesel Engines (T2)
    - Electrical / Electronic Systems (T6)
    - Heating, Ventilation and Air Conditioning (HVAC) (T7)
4. Identify the courses required for EVT III
  - State Fire Training
    - Emergency Vehicle Technician 3A : Fleet Specifications and Records
    - Emergency Vehicle Technician 3B : Human Resource Management
  - National Institute for Auto Service Excellence (ASE)
    - See eight courses listed for EVT I and EVT II
5. Identify any other requirements for EVT I
  - Code of Federal Regulations (CFR) 396.25: Department of Transportation Brake Inspector Qualification
  - Experience (one of the following)
    - Have a minimum of two years' full-time paid experience in a state or provincial fire agency, public agency, or private industry as an automotive or truck mechanic with minimum one year related to emergency vehicle maintenance

- Have a minimum of three years' full-time paid experience in a state or provincial fire agency, public agency, or private industry as a mechanic (no fire apparatus required)
  - Have a minimum of four years' volunteer or paid part-time experience in a state or provincial fire agency where emergency vehicle apparatus service and maintenance is part of assigned duties
6. Describe the capstone task book process
- Complete all prerequisites and course work
  - Submit application and fees and to request capstone task book
    - A candidate may apply for the EVT I and EVT II task books at the same time (two applications and two fees), but may not submit the EVT II task book until he or she receives EVT I certification (a prerequisite for EVT II)
  - Complete all job performance requirements included in the task book
  - Must have identified evaluator verify individual task completion via signature
  - Must have Fire Chief or authorized representative verify task book completion via signature
  - Must be employed by a California Fire Agency in the position prior to submitting completed task book to State Fire Training
7. Describe the capstone testing process
- Emergency Vehicle Technician certification exams (EVT I, EVT II, and EVT III) are administered by an independent third-party testing agency

### Discussion Questions

1. To be determined by the instructor

### Activities

1. To be determined by the instructor

### Instructor Notes

1. SFT teaches most EVT I (inspect and maintain) and EVT II (repair and replace) content together because depending on the size of the agency or shop, there are different expectations of the technician.

## Unit 2: Overview

### Topic 2-1: Terminology

#### Terminal Learning Objective

At the end of this topic, a student, given NFPA 1071 terminology, will be able to define inspection, maintenance, repair, and overhaul (rebuild) in accordance NFPA standards

#### Enabling Learning Objectives

1. Define "inspect(ion)"
  - To determine the condition or operation of a component(s) by comparing its physical, mechanical, and/or electrical characteristics with established standards, recommendations, and requirements through examination by sight, sound, or feel
2. Define "maintenance"

- The act of servicing a fire apparatus or a component in order to keep the vehicle and its components in proper operating condition
- 3. Define “repair”
  - To restore to sound condition after failure or damage
- 4. Define “overhaul (rebuild)”
  - To make extensive repairs in order to restore a component to like-new condition in accordance with the original manufacturer’s specifications

### Discussion Questions

1. Determined by instructor

### Activities

1. Determined by instructor

**CTS Guide Reference:** None

## Topic 2-2: The Inspection, Maintenance, Repair, and Testing Cycle

### Terminal Learning Objective

At the end of this topic, a student, given circumstances that initiate the inspection process, safety requirements, and an overview of appropriate facilities and equipment, will be able to describe the cycle of inspecting, maintaining, repairing, and testing emergency vehicle cabs and bodies and related components in accordance with NFPA standards

### Enabling Learning Objectives

1. Identify circumstances that initiate the inspection process
  - Acceptance test of new vehicle
  - Meeting manufacturer and/or AHJ inspection cycle
  - Responding to a suspected or reported problem
  - Acceptance test of repaired vehicle
2. Identify safety requirements
  - Vehicle safety
  - Technician safety
3. Identify facilities and equipment
  - Proper location(s) for inspection, maintenance, repair/replace, testing
  - Required tools/equipment
    - Test, calibration, and diagnostic
    - Inspection
    - Maintenance and repair
4. Describe the inspection process
  - Gather tools and safety equipment
  - Secure vehicle in a safe environment
  - Evaluate reported conditions (if applicable)
  - Perform operational tests
    - What if you can’t duplicate or validate the concern?
  - Identify and report defects and deficiencies, including broken, loose, worn, or missing parts

- Complete checklist and document findings
  - Checklists vary by manufacturer and authority having jurisdiction (AHJ)
  - Chassis checklist should, at a minimum, include:
    - Vehicle identification number (VIN) or unit number
    - Engine hours or mileage
    - Manufacturer inspection requirements
    - AHJ inspection requirements
    - Inspector name and signature
    - Inspection date
  - Return vehicle to service or move to maintenance or repair
- 5. Identify the role of a maintenance schedule and a maintenance checklist
  - Scheduling
  - Budgeting
    - Allocation
    - Cost reduction
    - Forecasting
  - Fleet lifecycle
  - Research and development
  - Audits
  - Legal protection
- 6. Describe the maintenance process
  - Identify the appropriate scope and authority for maintenance vs. repair activities
  - Identify individual technician's authorization for maintenance activities
  - Identify maintenance needs from inspection report
  - Gather tools and safety equipment
  - Secure vehicle in a safe environment
  - Evaluate reported conditions
    - Review inspection report
    - Identify repairs (outside maintenance scope)
    - Prioritize maintenance activities
  - Perform operational tests
  - Perform maintenance duties
  - Conduct performance tests
  - Complete checklist and document findings
  - Return vehicle to service or move to repair
- 7. Describe the repair and/or replacement process
  - Identify the appropriate scope and authority for internal vs. external repair activities
  - Identify individual technician's authorization for repair activities
  - Identify repair needs from inspection and/or maintenance report
  - Gather tools and safety equipment
  - Secure vehicle in a safe environment

- Evaluate reported conditions
- Perform operational tests
- Repair or replace deformed, broken, loose, worn, or missing parts
- Conduct performance tests
- Complete checklist and document findings
- Release to manufacturer or third-party shop for repair (if applicable)
  - Acceptance testing (inspection) on returned/repaired vehicle
  - Complete checklist and document findings
- Return vehicle to service

### Discussion Questions

1. Determined by instructor

### Activities

1. Determined by instructor

**CTS Guide Reference:** None

## Unit 3: Cab and Body Systems and Components

### Topic 3-1: Function, Construction, and Operation

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle, SOPs, and manufacturer specifications, will be able to describe the function, construction, and operation of cab and body systems and components in accordance with manufacturer specifications and the authority having jurisdiction (AHJ) requirements

#### Enabling Learning Objectives

1. Describe the function, construction, and operation of the crew and passenger compartments
  - Glass, windows, and mirrors
    - Manual
    - Electronic
  - Seats
  - Seatbelts and safety restraints
  - Doors, door hinges, latches, and door stops
  - Lighting
  - Climate control system
  - Instrumentation
  - Cab mounting system
    - Mounting brackets
    - Cab base structure
    - Resilient cushions
    - Securing fasteners
  - Equipment mounting systems
    - Mounting racks



- Manual
  - Electronic
  - Brackets
  - Latches
  - Interlocks and warning systems
    - Visual
    - Audible
  - Radios, computers, and siren controls
  - Self-contained breathing apparatus (SCBA)
  - Portable lights
  - Hand tools
  - Emergency medical service (EMS) equipment
  - Books, street directories, maps
- Cab tilting systems
  - Switches and remote controls
  - Interlocks
  - Motors and pumps
  - Reservoirs
  - Hoses and fittings
  - Cylinders and lifting devices
  - Cab support devices
  - Pivot points
  - Latches and hold-down devices
  - Hydraulic fluids
- 2. Describe the function, construction, and operation of the body and compartmentation
  - Compartments and storage areas
  - Lighting
  - Hinges, latches, and seals
  - Doors
  - Shelves and dividers
  - Hazard warning lights and interlocks
    - Visual
    - Audible
  - Steps, platforms, handrails, access ladders
  - Slip-resistant surfaces
  - Mechanical steps
  - Equipment mounting racks and brackets
  - Finishes and reflective stripping
  - Signs and labels

### Discussion Questions

1. What is the main purpose of the safety systems?
2. What might cause corrosion in the cab or body?

### Activities

1. Determined by instructor

**CTS Guide Reference:** CTS 3-1 / CTS 3-3 / CTS 3-4 / CTS 3-6 / CTS 3-7 / CTS 3-8 / CTS 3-9 / CTS 3-11

### Topic 3-2: Electricity and Electronics

#### Terminal Learning Objective

At the end of this topic, a student, given principles of electricity, electrical connection, and operational theory, will be able to apply those principles and theories to the electrical systems in the cab and body in accordance with manufacturer specifications and authority having jurisdiction (AHJ) requirements

#### Enabling Learning Objectives

1. Identify the principles of electricity and the operational theory of electronics
  - Principles of electricity and electronics
    - Ohm's law
      - Resistance goes up / amperage goes down
      - Amperage goes up / resistance goes down
    - Watt's law
      - Electrical law of work
    - Kirchhoff's law
      - All voltage is used up by the time the circuit is complete
      - Amperage will be the same throughout the circuit
  - Electrical systems in the cab and body
    - Low voltage
      - Batteries
      - Starter
      - Alternator
      - Wiring
    - Line voltage
      - Power generation system
      - Shore power
    - Electronic
      - Interface electronics (e.g. pump control module, engine status center, transmission control module, anti-lock brake system module, etc.)
      - Load management systems
2. Identify electrical connection theory and maintenance
3. Describe electrical troubleshooting procedures
  - Test system's all-inclusive voltage drop
4. Measure voltage, amperage, and resistance

#### Discussion Questions

1. What are some grounding sources?

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### Activities

1. Determined by instructor

### Instructor Notes

1. Electrical is referenced here as part of the complete cab and body system. Complete curriculum for inspecting electrical systems is found in Emergency Vehicle Technician 1D : Electrical Systems A and Emergency Vehicle Technician 2A : Electrical Systems B. Keep this brief.

**CTS Guide Reference:** CTS 3-5 / CTS 3-6 / CTS 3-8

## Topic 3-3: Welding and Fabrication

### Terminal Learning Objective

At the end of this topic, a student, given basic welding and fabrication principles and techniques, will be able to apply welding and fabrication procedures needed to maintain and repair systems and components and in the cab and body in accordance with manufacturer specifications and authority having jurisdiction (AHJ) requirements

### Enabling Learning Objectives

1. Describe basic welding and fabrication procedures
2. Identify welding experience and/or certification requirements for different parts of an apparatus

### Discussion Questions

1. Determined by instructor

### Activities

1. Determined by instructor

### Instructor Notes

1. It is beyond the scope of this course to teach welding. However students should be familiar with basic techniques for minor repairs.

**CTS Guide Reference:** CTS 3-3 / CTS 3-6 / CTS 3-8 / CTS 3-11

## Unit 4: Inspection, Maintenance, and Repair

### Topic 4-1: Crew and Passenger Compartments

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle (with a cab tilt system) and its assigned equipment, SOPs, manufacturer specifications, an inspection checklist (or assignment), a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the crew and passenger compartments and related components so that the operation and condition of the crew and passenger compartments and related components are verified, or preserved and restored, to be within manufacturer specifications; the condition of finishes, signs, labels, and paint is determined and documented; climate control systems are tested for proper operation; the tilt mechanism is readied safe; the structural

integrity is assessed; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; warning system components function; all hoses are tight; leaks are stopped; latches are aligned and adjusted to operational condition; fluids are checked and filled; any electrical connections are clean and tight; worn pads are replaced; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; components are fabricated, adjusted, aligned, and lubricated; all checklist items are inspected; additional repair needs are reported; defective components are diagnosed; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer specifications; operational tests are conducted and performance is verified; hazardous conditions are avoided or resolved; and inspections, activities, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### **Enabling Learning Objectives**

1. Identify types of defects, deficiencies, and potential problems associated with crew and passenger compartments and related components
2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction
3. Describe how to select test, calibration, and diagnostic equipment
4. Identify materials used in crew and passenger compartments and related components
5. Identify and describe types of fluids and lubricants
6. Identify failures and restoration of finishes, signs, labels, and paint
7. Identify leak classifications and methods to stop them
8. Describe troubleshooting procedures
9. Describe adjustment, calibration, and alignment methods and procedures
10. Identify personnel safety restraint systems that may present hazards during cab repair
11. Describe principles of pneumatic, hydraulic, and electric operation
12. Describe repair, rebuild, and replacement procedures
13. Identify required verification testing
14. Identify inspection, maintenance, and repair record-keeping requirements
15. Recognize and identify symptoms and conditions of crew and passenger compartments and related components
16. Use test, calibration, and diagnostic equipment
17. Determine defects, deficiencies, and potential problems
18. Recognize, identify, and evaluate reported conditions
19. Perform all required maintenance (including checklist items) to resolve deficiencies
20. Mitigate personnel safety restraint system hazards
21. Apply paint and finish materials
22. Perform all required repairs to resolve deficiencies
23. Perform operational and verification tests
24. Complete inspection, maintenance, and repair checklists and documentation

### **Discussion Questions**

1. What can cause an out of service seat belt?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the crew and passenger compartments, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 3-3 / CTS 3-1 / CTS 3-2 / CTS 3-11

## Topic 4-2: Cab Mounting System

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle (with a cab tilt system) and its assigned equipment, SOPs, manufacturer specifications, an inspection checklist (or assignment), a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the cab mounting system and related components so that the operation and condition of the cab mounting system and related components are verified, or preserved and restored, to be within manufacturer specifications; the condition of finishes, signs, labels, and paint is determined and documented; climate control systems are tested for proper operation; the tilt mechanism is readied safe; the structural integrity is assessed; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; warning system components function; all hoses are tight; leaks are stopped; latches are aligned and adjusted to operational condition; fluids are checked and filled; any electrical connections are clean and tight; worn pads are replaced; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; components are fabricated, adjusted, aligned, and lubricated; all checklist items are inspected; additional repair needs are reported; defective components are diagnosed; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer specifications; operational tests are conducted and performance is verified; hazardous conditions are avoided or resolved; and inspections, activities, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### Enabling Learning Objectives

1. Identify types of defects, deficiencies, and potential problems associated with cab mounting system and related components
2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction
3. Describe how to select test, calibration, and diagnostic equipment
4. Identify materials used in cab mounting system and related components
5. Identify and describe types of fluids and lubricants
6. Identify failures and restoration of finishes, signs, labels, and paint
7. Identify leak classifications and methods to stop them

8. Describe troubleshooting procedures
9. Describe adjustment, calibration, and alignment methods and procedures
10. Identify personnel safety restraint systems that may present hazards during cab repair
11. Describe principles of pneumatic, hydraulic, and electric operation
12. Describe repair, rebuild, and replacement procedures
13. Identify required verification testing
14. Identify inspection, maintenance, and repair record-keeping requirements
15. Recognize and identify symptoms and conditions of cab mounting system and related components
16. Use test, calibration, and diagnostic equipment
17. Determine defects, deficiencies, and potential problems
18. Recognize, identify, and evaluate reported conditions
19. Perform all required maintenance (including checklist items) to resolve deficiencies
20. Mitigate personnel safety restraint system hazards
21. Apply paint and finish materials
22. Perform all required repairs to resolve deficiencies
23. Perform operational and verification tests
24. Complete inspection, maintenance, and repair checklists and documentation

### Discussion Questions

1. What might cause worn cab bushings?
2. Does fluid type matter?

### Activities

1. Determined by instructor
2. Throughout hands-on lecture in the shop, utilize students to inspect the cab mounting system, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 3-3 / CTS 3-4 / CTS 3-5 / CTS 3-6

## Topic 4-3: Equipment Mounting Systems

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle (with a cab tilt system) and its assigned equipment, SOPs, manufacturer specifications, an inspection checklist (or assignment), a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the equipment mounting systems and related components so that the operation and condition of the equipment mounting systems and related components are verified, or preserved and restored, to be within manufacturer specifications; the condition of finishes, signs, labels, and paint is determined and documented; the tilt mechanism is readied safe; the structural integrity is assessed; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; warning system components function; all hoses are tight; leaks are stopped; latches are aligned and adjusted to operational condition; fluids are checked and filled; any electrical connections are clean and tight; worn pads are replaced;

skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; components are fabricated, adjusted, aligned, and lubricated; all checklist items are inspected; additional repair needs are reported; defective components are diagnosed; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer specifications; operational tests are conducted and performance is verified; hazardous conditions are avoided or resolved; and inspections, activities, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### **Enabling Learning Objectives**

1. Identify types of defects, deficiencies, and potential problems associated with equipment mounting system and related components
2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction
3. Describe how to select test, calibration, and diagnostic equipment
4. Identify materials used in equipment mounting system and related components
5. Identify and describe types of fluids and lubricants
6. Identify failures and restoration of finishes, signs, labels, and paint
7. Identify leak classifications and methods to stop them
8. Describe troubleshooting procedures
9. Describe adjustment, calibration, and alignment methods and procedures
10. Identify personnel safety restraint systems that may present hazards during cab repair
11. Describe principles of pneumatic, hydraulic, and electric operation
12. Describe repair, rebuild, and replacement procedures
13. Identify required verification testing
14. Identify inspection, maintenance, and repair record-keeping requirements
15. Recognize and identify symptoms and conditions of equipment mounting system and related components
16. Use test, calibration, and diagnostic equipment
17. Determine defects, deficiencies, and potential problems
18. Recognize, identify, and evaluate reported conditions
19. Perform all required maintenance (including checklist items) to resolve deficiencies
20. Mitigate personnel safety restraint system hazards
21. Apply paint and finish materials
22. Perform all required repairs to resolve deficiencies
23. Perform operational and verification tests
24. Complete inspection, maintenance, and repair checklists and documentation

### **Discussion Questions**

1. Should broken equipment supports be fixed?
2. What are some different classes of leaks?

### **Activities**

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the equipment mounting systems, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 3-3 / CTS 3-4 / CTS 3-5 / CTS 3-6

### Topic 4-4: Cab Tilting Systems

#### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle (with a cab tilt system) and its assigned equipment, SOPs, manufacturer specifications, an inspection checklist (or assignment), a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the cab tilting systems and related components so that the operation and condition of the cab tilting systems and related components are verified, or preserved and restored, to be within manufacturer specifications; the condition of finishes, signs, labels, and paint is determined and documented; the tilt mechanism is readied safe; the structural integrity is assessed; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; warning system components function; all hoses are tight; leaks are stopped; latches are aligned and adjusted to operational condition; fluids are checked and filled; any electrical connections are clean and tight; worn pads are replaced; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; components are fabricated, adjusted, aligned, and lubricated; all checklist items are inspected; additional repair needs are reported; defective components are diagnosed; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer specifications; operational tests are conducted and performance is verified; hazardous conditions are avoided or resolved; and inspections, activities, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

#### Enabling Learning Objectives

1. Identify types of defects, deficiencies, and potential problems associated with the cab tilting system and related components
2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction
3. Describe how to select test, calibration, and diagnostic equipment
4. Identify materials used in the cab tilting system and related components
5. Identify and describe types of fluids and lubricants
6. Identify failures and restoration of finishes, signs, labels, and paint
7. Identify leak classifications and methods to stop them
8. Describe troubleshooting procedures
9. Describe adjustment, calibration, and alignment methods and procedures
10. Identify personnel safety restraint systems that may present hazards during cab repair



11. Describe principles of pneumatic, hydraulic, and electric operation
12. Describe repair, rebuild, and replacement procedures
13. Identify required verification testing
14. Identify inspection, maintenance, and repair record-keeping requirements
15. Recognize and identify symptoms and conditions of the cab tilting system and related components
16. Use test, calibration, and diagnostic equipment
17. Determine defects, deficiencies, and potential problems
18. Recognize, identify, and evaluate reported conditions
19. Perform all required maintenance (including checklist items) to resolve deficiencies
20. Mitigate personnel safety restraint system hazards
21. Apply paint and finish materials
22. Perform all required repairs to resolve deficiencies
23. Perform operational and verification tests
24. Complete inspection, maintenance, and repair checklists and documentation

### Discussion Questions

1. How are an electric cab tilt system and a hydraulic cab tilt system different?
  - How are they similar?
2. Is a “locked” indicator required?

### Activities

1. Determined by instructor

### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the cab tilting systems, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 3-7 / CTS 3-8

## Topic 4-5: Body and Compartmentation

### Terminal Learning Objective

At the end of this topic, a student, given an emergency response vehicle (with a cab tilt system) and its assigned equipment, SOPs, manufacturer specifications, an inspection checklist (or assignment), a maintenance checklist, a maintenance schedule (or assignment), an inspection report detailing a deficiency or deformation (or assignment), tools, and test, calibration, and diagnostic equipment, will be able to inspect and perform maintenance and repairs on the body and compartmentation and related components so that the operation and condition of the body and compartmentation and related components are verified, or preserved and restored, to be within manufacturer specifications; the condition of finishes, signs, labels, and paint is determined and documented; climate control systems are tested for proper operation; the tilt mechanism is readied safe; the structural integrity is assessed; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; warning system components function; all hoses are tight; leaks are stopped; latches are aligned and adjusted to operational condition; fluids are checked and filled; any electrical connections are clean and tight; worn pads are replaced; skid-resistant walking surfaces are

intact; finishes and surfaces are clean and preserved; components are fabricated, adjusted, aligned, and lubricated; all checklist items are inspected; additional repair needs are reported; defective components are diagnosed; defects and deficiencies, including broken, loose, worn, or missing parts, are identified and reported and then repaired, rebuilt, or replaced to manufacturer specifications; operational tests are conducted and performance is verified; hazardous conditions are avoided or resolved; and inspections, activities, tests, and repairs are documented in accordance with the procedures of the manufacturer and the authority having jurisdiction (AHJ)

### **Enabling Learning Objectives**

1. Identify types of defects, deficiencies, and potential problems associated with the body and compartmentation and related components
2. Describe the inspection, diagnostic, maintenance, and repair procedures of the manufacturer and the authority having jurisdiction
3. Describe how to select test, calibration, and diagnostic equipment
4. Identify materials used in the body and compartmentation and related components
5. Identify and describe types of fluids and lubricants
6. Identify failures and restoration of finishes, signs, labels, and paint
7. Identify leak classifications and methods to stop them
8. Describe troubleshooting procedures
9. Describe adjustment, calibration, and alignment methods and procedures
10. Identify personnel safety restraint systems that may present hazards during cab repair
11. Describe principles of pneumatic, hydraulic, and electric operation
12. Describe repair, rebuild, and replacement procedures
13. Identify required verification testing
14. Identify inspection, maintenance, and repair record-keeping requirements
15. Recognize and identify symptoms and conditions of the body and compartmentation and related components
16. Use test, calibration, and diagnostic equipment
17. Determine defects, deficiencies, and potential problems
18. Recognize, identify, and evaluate reported conditions
19. Perform all required maintenance (including checklist items) to resolve deficiencies
20. Mitigate personnel safety restraint system hazards
21. Apply paint and finish materials
22. Perform all required repairs to resolve deficiencies
23. Perform operational and verification tests
24. Complete inspection, maintenance, and repair checklists and documentation

### **Discussion Questions**

1. Are loose mountings a concern?
2. Will “cosmetic damage” put a unit out of service?

### **Activities**

1. Determined by instructor

## Emergency Vehicle Technician 1C

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### Instructor Notes

1. Throughout hands-on lecture in the shop, utilize students to inspect the body and compartmentation, identify maintenance requirements, and recommend potential repairs.

**CTS Guide Reference:** CTS 3-1 / CTS 3-2 / CTS 3-3 / CTS 3-9 / CTS 3-10 / CTS 3-11

## Emergency Vehicle Technician 1C

### Time Table

Segment	Lecture Time	Activity Time	Total Unit Time
<b>Unit 1: Introduction</b>			
Topic 1-1: Orientation and Administration			
Lecture	0:30		
Activity 1-1: Determined by instructor		0:00	
Topic 1-2: Emergency Vehicle Technician Certification Process			
Lecture	0:30		
Activity 1-2: Determined by instructor		0:00	
<b>Unit 1 Totals</b>	<b>1:00</b>	<b>0:00</b>	<b>1:00</b>
<b>Unit 2: Overview</b>			
Topic 2-1: Terminology			
Lecture	0:10		
Activity 2-1: Determined by instructor		0:00	
Topic 2-2: The Inspection, Maintenance, Repair, and Testing Cycle			
Lecture	0:20		
Activity 2-2: Determined by instructor		0:00	
<b>Unit 2 Totals</b>	<b>0:30</b>	<b>0:00</b>	<b>0:30</b>
<b>Unit 3: Cab and Body Systems and Components</b>			
Topic 3-1: Function, Construction, and Operation			
Lecture	0:30		
Activity 3-1: Determined by instructor		0:00	
Topic 3-2: Electricity and Electronics			
Lecture	0:30		
Activity 3-2: Determined by instructor		0:00	
Topic 3-3: Welding and Fabrication			
Lecture	0:30		
Activity 3-3: Determined by instructor		0:00	
<b>Unit 3 Totals</b>	<b>1:30</b>	<b>0:00</b>	<b>1:30</b>
<b>Unit 4: Inspection, Maintenance, and Repair</b>			
Topic 4-1: Crew and Passenger Compartments			
Lecture	0:30		
Activity 4-1: Determined by instructor		0:00	
Topic 4-2: Cab Mounting System			
Lecture	3:00		

## Emergency Vehicle Technician 1C

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Segment	Lecture Time	Activity Time	Total Unit Time
Activity 4-2: Determined by instructor		0:00	
Topic 4-3: Equipment Mounting Systems			
Lecture	0:30		
Activity 4-3: Determined by instructor		0:00	
Topic 4-4: Cab Tilting Systems			
Lecture	3:00		
Activity 4-4: Determined by instructor		0:00	
Topic 4-5: Body and Compartmentation			
Lecture	1:00		
Activity 4-5: Determined by instructor		0:00	
<b>Unit 4 Totals</b>	<b>8:00</b>	<b>0:00</b>	<b>8:00</b>
<b>Lecture, Activity, and Unit Totals:</b>	<b>11:00</b>	<b>0:00</b>	<b>11:00</b>

### Course Totals

Total Lecture Time (LT)	11:00
Total Activity Time (AT)	0:00
Total Testing Time (TT)	1:00
<b>Total Course Time</b>	<b>12:00</b>